

Remarks

Reconsideration and withdrawal of the objection and rejections set forth in the above-mentioned Official Action in view of the foregoing amendments and the following remarks are respectfully requested.

Claims 1-3, 6-18 and 21-59 are now pending in the application, with Claims 1, 14, 29, 44, 49 and 54 being independent. Claims 4, 5, 19 and 20 have been cancelled without prejudice and Claim 59 has been added herein.

Applicants note the Examiner's withdrawal of Claims 3, 29-43 and 54-58 from further consideration at this time. It is respectfully requested that, that because Claim 1 is allowable for the reasons discussed below, Claim 3 be rejoined and also allowed.

The drawings were objected to for allegedly not showing openings in the form of slots or openings in the form of slots and holes. Without conceding the propriety of this objection, Claims 4, 5, 19 and 20 have been cancelled. These changes have been made for no reasons related to patentability. Reconsideration and withdrawal of the objection to the drawings are requested.

Claims 1, 2, 7, 8, 10-13 and 44-48 were rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 2,735,720 (Evert). Claims 4-6 were rejected under 35 U.S.C. § 103 as being unpatentable over Evert. Claim 9 was rejected under § 103 as being unpatentable over Evert in view of any one of U.S. Patent No. 487,342 (Wittemann), U.S. Patent No. 723,453 (Fletcher), U.S. Patent No. 984,212 (Gray) or U.S. Patent No. 4,735,750 (Damann). Claims 14-28 and 49-53 were rejected under § 103 as being

unpatentable over Evert in view of either Fletcher or Gray. These rejections are respectfully traversed.

With the arrangements and methods of the independent claims, carbonation efficiency can be improved by maximizing exposure time of liquid ejected from the diffuser to gaseous carbon dioxide. By atomizing the liquid, a high degree of surface area exposure to the CO₂ atmosphere inside the vessel can be attained. Further, by ejecting the liquid in a horizontal plane (Claims 1 and 44), the atomized droplets can maintain a longer trajectory in the atmospheric carbon dioxide before they hit either a side of the vessel or the pooling water within the vessel. By ejecting the liquid from openings arranged in horizontal rows such that openings in adjacent rows are not in vertical alignment with each other (Claims 14 and 49), the ejected droplets will likely not collide with one another and combine into larger droplets, thus also not decreasing the available liquid surface area for CO₂ absorption.

High carbonating efficiency is needed in post-mix beverage systems to achieve carbonation of bottle and can quality within a range of 4.7-5.0 volumes of CO₂. The arrangements and methods of the present invention are highly efficient due to the features noted above and therefore can operate with low water supply pressures. Therefore, diaphragm pumps, which can run dry without performance degradation, can be used. The dry run capability increases system reliability and product quality.

Evert relates to a carbonator including a horizontal elongated tank into which water and carbonic acid gas are supplied. The water is supplied through a main pipe 21 to a nozzle block 22 having a main chamber 23 and a pair of spray heads 26, 27. A

flow-directing member 25 having a spiral rib is provided in the main chamber 23 to impart to the liquid a whirling motion as a liquid moves from the interior of the chamber toward each end and out through the discharging orifices of the spray heads. A resulting pair of whirling sprays are emitted from the spray heads to come in contact with gas in the upper half of the tank and to agitate the surface of the liquid in the tank.

Due to the angular momentum of the whirling sprays, Applicants submit that the water from each of the spray heads in Evert forms a conical flow pattern that is directed towards the pooling water and the sides and tops of the tank. Evert does not disclose or suggest atomized liquid ejected in a direction that is substantially in a horizontal plane, as is recited in independent Claims 1 and 44. Nor does Evert disclose or suggest that the plurality of openings of the diffuser are arranged in horizontal rows such that openings in adjacent rows of the plurality of openings are not in vertical alignment with each other, as is recited in independent Claims 14 and 49.

Thus, Evert fails to disclose or suggest important features of the present invention recited in independent Claims 1, 14, 44 and 49.

The remaining citations have been reviewed, but it is respectfully submitted that one of ordinary skill in the art would not look to any of these citations to modify the teachings of Evert. Wittemann describes carbonating beverages by ejecting the beverage through a spray-head B having several outlets. Fletcher describes forcing water through lateral perforations jj. Gray describes a muffler for an internal combustion engine, in which water is sprayed through several perforations onto a thimble. Damann describes a device for dissolution of gas in liquid and includes lateral outlets 10 for a gas/liquid

solution mixture. However, it is respectfully submitted that one of ordinary skill in the art would not be motivated to modify the carbonator of Evert with the teachings of any of the secondary citations. As discussed above, the nozzle block 22 of Evert includes only two spray heads and a flow directing member 25, which imparts the whirling motion of the liquid. Not only would rows of plural outlets not be required in Evert because the whirling sprays effectively come into contact with almost all of the gas in the upper half of the tank (col. 3, lines 38-46), but to construct a nozzle block with one or more flow directing members to accommodate more than one row of plural outlets would be beyond the skill of an ordinarily-skilled artisan.

Thus, independent Claims 1, 14, 44 and 49 are patentable over the citations of record. Reconsideration and withdrawal of the §§ 102 and 103 rejections are respectfully requested.

For the foregoing reasons, Applicants respectfully submit that the present invention is patentably defined by independent Claims 1, 14, 44 and 49. Dependent Claims 2, 3, 6-13, 15-18, 21-28, 45-48, 50-53 and 59 are also allowable, in their own right, for defining features of the present invention in addition to those recited in their respective independent claims. Individual consideration of the dependent claims is requested.

Applicants submit that the present application is in condition for allowance. Favorable reconsideration, withdrawal of the rejections set forth in the above-noted Office Action, and an early Notice of Allowance are requested.

Applicants' undersigned attorney may be reached in our Washington, D.C.
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Respectfully submitted,


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